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"HEAD OF SNAKE, WINGS OF BUTTERFLY, AND BODY OF CICADA": IMPRESSIONS OF THE LANTERN-FLY (HEMIPTERA: FULGORIDAE) IN THE VILLAGE OF PEDRA BRANCA, BAHIA STATE, BRAZIL

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To the memory of Darrell Addison Posey (1947–2001)

ABSTRACT.—Four aspects of the ethnoentomology of the lantern-fly (*Fulgora laternaria* L., 1767) were studied in Pedra Branca, Brazil. A total of 45 men and 41 women were consulted through open-ended interviews and their actions were observed in order to document the wisdom, beliefs, feelings, and behaviors related to the lantern-fly. People's perceptions of the external shape of the insect influence its ethnotaxonomy, and they may categorize it into five different ethnosemantic domains. Villagers are familiar with the habitat and food habits of the lantern-fly; they say it lives on the trunk of *Simarouba* sp. (Simaroubaceae) by feeding on sap with the aid of its 'sting'. The culturally constructed attitudes toward this insect are that it is a fearsome organism that should be exterminated whenever it is found because it makes 'deadly attacks' on plants and human beings. Local ideas about the origin of the lantern-fly, the metamorphosis process, as well as its transformation into another organism were also recorded. The insect inspires feelings of fear and aversion which create obstacles to developing an efficient strategy for the conservation of *Fulgora* species. Environmental education can play a significant role in changing these negative attitudes.

Key words: ethnoentomology, folk knowledge, Hemiptera, Fulgoridae, *Fulgora laternaria*.

RESUMO.—O artigo refere-se à etnoentomologia da jequitiranabóia (*Fulgora laternaria* L., 1767), baseando-se nas quatro dimensões conectivas que os seres humanos podem manter com o inseto. O trabalho de campo foi realizado no povoado de Pedra Branca entre os meses de fevereiro a maio de 2001. Foram consultados 45 homens e 41 mulheres através de entrevistas abertas e observações comportamentais, com o objetivo de registrar os conhecimentos, as crenças, os sentimentos e os comportamentos relacionados com o inseto. Os resultados demonstram que a percepção que os moradores têm da aparência externa do animal influencia em sua etnotaxonomia, uma vez que foi categorizado em cinco domínios etnossemânticos distintos. Os conhecimentos nativos referentes ao hábitat e à ecologia trófica da jequitiranabóia revelam que ela vive nos troncos de *Simarouba*

sp. (Simaroubaceae), alimentando-se da seiva por meio do 'ferrão'. As atitudes culturalmente construídas com relação ao inseto colocam-no como um ser que deve ser exterminado ou temido sempre que encontrado devido à crença do 'ataque mortífero' a plantas e seres humanos. Impressões locais sobre a origem da jequitiranabóia, o processo de metamorfose, bem como de sua transformação em um outro organismo também foram registradas. Os sentimentos de medo e aversão ao inseto representariam obstáculos para a realização de uma estratégia eficaz de conservação das espécies de *Fulgora*. Daí, o papel significativo da educação ambiental para modificar essa visão.

RÉSUMÉ.—Ce rapport étudie quatre aspects de l'éthnoentomologie du fulgore porte-lanterne (*Fulgora laternaria* L., 1767) à Pedra Branca au Brésil entre les mois de février à mai de 2001. Les auteurs ont consulté 45 hommes et 41 femmes au total en utilisant un système de questions ouvertes. Ils on observé leur réactions pour documenter leurs connaissances, croyances, points de vues, et comportements relatifs au fulgore porte-lanterne. Les résultats montrent que les indigènes classifient l'insecte en cinq différents domaines ethnosémantiques, et fondent l'ethnotaxonomie sur leur interprétation de l'apparence extérieure de l'insecte. Ils connaissent l'hábitat et les habitudes alimentaires du fulgore porte-lanterne: ils disent que l'insecte vit sur le tronc du *Simarouba* sp. (Simaroubaceae), et se nourrit de la sève avec son 'dard'. Pour la culture locale, c'est un insecte redoutable à exterminer où qu'il soit, à cause de ses attaques mortelles contre les plantes et les êtres humains. Cet article document également les croyances locales relatives à l'origine du fulgore porte-lanterne, à son processus de métamorphose, et à sa transformation en un différent organisme. L'insecte inspire des sentiments de peur et de dégoût qui gênent la mise au point de vue d'une stratégie efficace pour la protection de l'espèce. Une éducation en matière d' environnement pourrait grandement modifier ces attitudes hostiles.

INTRODUCTION

Jequitiranabóia damned snake.
The reason for thy pains is in the name.
Death is what you shall expect, insect!
Bug without a delineated shape
First a cicada, then a snake, then a moth.
Worthless even as medicine.
Does nothing but wilt trees
And disturb the countryfolk.

Costa-Neto, 2001

Insects of the genus *Fulgora* L., 1767 are commonly known as lantern-flies and alligator-headed or peanut-headed insects. Folk beliefs about them abound, especially due to their unusual shape. Since the first European colonization of the New World, chroniclers, travelers, and natural historians have recorded native impressions of these strange insects (Hogue 1993). The species *Fulgora laternaria* L., 1767 (= *Laternaria phosphorea* L., 1764), for example, is supposed to bear a devastating poison that dries up those trees on which it feeds or rests, and also kills both men and animals (Carrera 1991; Costa Lima 1942; Fonseca 1926, 1932;

Janzen and Hogue 1983; Neiva and Penna 1916; Poulton 1928; Wied 1940). This belief is widespread from the Atlantic to the Andes, and is shared not only by the simple and superstitious but by persons of higher education (Poulton 1932). In the northeastern Brazilian State of Ceará the insect's folk name is synonymously used to describe a terrible person (Lenko and Papavero 1996) and is applied to any individual who has lost his good reputation. In Peru, the *chicharra machacui,* as it is locally known, is as dreaded as a serpent because people believe its sting is equally mortal (Dourojeanni 1965). In Costa Rica, peasants believe that the insect's huge, peanut-shaped head is full of poison. If someone is stung by the insect, he or she must have sexual intercourse within twenty-four hours. Otherwise, he or she will die (Ross 1994). According to Ross, urgency of treatment varies: one woman told him that a 'cure' would be necessary within 15 minutes, and that, for a man, a virgin would provide the best antidote. This legend is partly blamed for Costa Rica's soaring birthrate. It is not surprising that, in Colombia, the colloquial expression *picado por la machaca* (stung by the lantern-fly) is applied to a person who has a great sexual appetite (Anzola 2001). However, this seems to be more of a ruse invented by local men and used to their personal advantage than a valid folktale (Hogue 1993).

Due to their significance in legends, lantern-flies are represented in the graphic and plastic arts, as well as in the music of different South American countries. In 1987, on the occasion of the fiftieth anniversary of the Brazilian Society for Entomology (BSE), the Brazilian Post Office issued a set of two commemorative stamps. One of them depicted the species *F. servillei* Spinola, 1839 (actually *Fulgora laternaria*), which is the symbol of the BSE. Similarly, the Colombian Society for Entomology has the anecdotal periodical *La Machaca* as one of its newsletters. In the folkloric music of Ecuador and Colombia, the fast *cumbia* rhythm is said to reflect the emotions that follow from the insect's bite (Ross 1994). The insect is still regarded as a tourist attraction and has value as a souvenir (Hogue 1984). In 1964, a specimen was sold for nine dollars in Tingo Maria, Selva Central, Peru (Organização dos Estados Americanos 1987).

Fulgora spp. belong to the order Hemiptera, suborder Fulgoromorpha, superfamily Fulgoroidea, and family Fulgoridae (Bourgoin and Campbell 2002). Fulgorids may be distinguished by a combination of the second hind tarsomere with a row of apical spines and both apical and anal area of hind wings with cross veins (O'Brien and Wilson 1985). According to these authors, Fulgoridae is comprised of 108 genera and 543 species, which are distributed in the following geographical zones: nearctic (16 species), neotropical (242 species), Ethiopian (104 species), Oriental (180 species), and Australian (18 species). These numbers, however, need to be updated. The genus *Fulgora* ranges from southern Mexico to northern Argentina, and is represented by eight species (O'Brien 1989). The generic name probably owes its origin to the ancient Roman goddess Fulgora, who protected houses against lightning and terrible storms. *Fulgor* is the Latin word for lightning, brightness (Ross 1994).

Although fulgorids are notable for their size (some species are 7 mm in length, but some are 95 mm [O'Brien and Wilson 1985]), bizarre forms, brilliant colors, and wax secretions, there is very little scientific information about the biology and life cycle of the large neotropical members (Hogue et al. 1989). The exceptions are

for those species reported to be of economic importance, such as *Phrictus diadema* (L.) Spinola, 1839 on cocoa trees (*Theobroma cacao* L.) in Brazil and *Pyrops candelaria* (L.) on longan (*Euphoria longana* Lam.) and mango (*Mangifera indica* L.) in Asia (O'Brien 1989). There are, however, some initiatives expanding our knowledge of their biology, such as the project "Biodiversity and Evolution of Fulgoromorpha: a Global Research Initiative," by Bourgoin and Hoch (1999).

The present work investigates the knowledge, beliefs, feelings, and behaviors that are related to the lantern-fly in the village of Pedra Branca, Bahia State. It is hoped that ethnoentomological knowledge will contribute to better scientific understanding of this group.

METHODOLOGY

Data presented here are part of a broader research project that aims to record the ethnoentomology of Pedra Branca's villagers. A former settlement of the Kiriri Indians that was established by the Portuguese pioneer Gabriel Soares de Souza in the sixteenth century, the village is located at the Middle Paraguaçu, west central region of Bahia State, northeastern Brazil (Paraíso 1985). It is inside the municipality of Santa Terezinha (which is also the capital), but it is about 13 km away from it. It is situated at the base of the Serra da Jibóia, a mountain range of about 225 km^2 of area whose peak elevation is 805 m above sea level. It lies between 12°46′ south latitude and 39°32′ west longitude (Juncá et al. 1999).

In 1991, the resident population in the county of Santa Terezinha was 8,851 individuals (Centro de Estatística e Informações 1994). The actual population in the village of Pedra Branca is nearly 400 persons (about 80 families according to the local Health Assistant), who depend on cassava cultivation (*Manihot esculenta* Crantz.) as their main economic activity. Livestock is also important, mainly cattle and goats.

This region, which is totally included in the Drought Polygon, has a semi-arid climate with a mean annual temperature of 24.3°C and a mean annual rainfall of 582 mm. The rainy period lasts from November to January. The vegetation of the Serra da Jibóia includes *campo rupestre* savannas on the peaks; dense, ombrophilous Atlantic coastal forest in the valleys and on the slopes; semi-deciduous forest at the base; and arboreal Caatinga in the north. The soil is good for agricultural activities and not bad for livestock-raising (Centro de Estatística e Informações 1994).

Fieldwork was carried out over 64 days from February to May 2001 by one of the authors (EMCN), who also did the translations into English. Both open-ended interviews followed ethnoscientific principles (Posey 1986b; Sturtevant 1964). Informal observations of behavior related to lantern-flies were also recorded. Forty-five men and forty-one women, whose ages ranged from 13 to 108 years old, constituted the sample universe. This sample accounts for just those interviewees who provided information about the lantern-fly. Interviews were conducted in Portuguese since the villagers are Portuguese-speakers. Both individual and collective interviews were done to elicit native impressions on the insect, and people talked freely about other insects as well. Most of the interviews were re-

corded in microtapes; semi-literal transcriptions are deposited at the Laboratory of Ethnobiology of the Universidade Estadual de Feira de Santana (UEFS).

Data were analyzed by using the union model (Marques 1991), which involves considering all available information on the surveyed subject. Controls were performed both through consistency checking tests and reply validity tests, which make use of repeated inquiries in synchronic and diachronic conditions, respectively. One tests consistency by asking different people the same question within a very short time period. Reply validity is tested by asking the same question to the same person at different times. Two undergraduate volunteers, who have been in the village three times, helped the authors interview the subjects.

During the fieldwork period just one specimen of lantern-fly was collected by a villager, when it suddenly appeared in the village one night. This allowed us to conduct projective tests. These consisted in displaying both the photograph and the specimen itself to the informants in order to prompt them to talk about the insect. Their reactions and those of the rest of the members of the community (many of whom had never seen the insect before) were recorded during the interviews. The specimen, which was identified as *Fulgora laternaria* L. 1767,[1] was handled in accordance with the usual patterns for scientific collections and was deposited in the entomological collection at UEFS.

RESULTS AND DISCUSSION

The relationship between the Pedra Branca villagers and the insect has four dimensions: cognitive, ideological, affective, and ethological. With regard to the cognitive dimension, native knowledge about the lantern-fly's ethnotaxonomy, habitat, feeding ecology, and its transformation into another being were recorded. The way people behave toward it (ethological dimension) results from the way they perceive it (ideological dimension) and how they feel about it (affective dimension). All the interactive processes that occur between villagers and the lantern-fly (and the rest of the biotic elements from the surroundings as well) pass through these four dimensions. Despite being cryptic, nocturnal, solitary, silent, and rare, *Fulgora laternaria* stands out as one of the insects that has a cultural importance to these villagers. Its importance is not utilitarian, since this insect is neither a food nor a medicinal resource. Rather, it is 'good to think' in the Lévi-Straussian sense (Lévi-Strauss 1989). Some of the gender-based differences related to the ethnodiagnostic criteria (morphological, biological, and noxious criteria) which were attributed to the lantern-fly are shown in Table 1.

In the village of Pedra Branca, *Fulgora laternaria* is known by at least six different names. Twenty-five interviewees called it a *jitiranabóia;* eleven referred to it as a *jitirana;* nine treated it as a *cobra-de-asa;* eight referred to it as a *tiranabóia;* three termed it a *cobra-cega.* A single informant called it a *serra-velha.*

Several synonyms are found throughout Brazil. These are: *gitirana, jitirana, jaquiranabóia, jaquitiranabóia, jequitiranabóia, jiquitiranabóia, jaquitirana, jequitirana, jitiranabóia, tiranabóia, tirambóia, cobra-voadora, cobra-do-eucalipto, cobra-de-asa, cobra-do-ar, cobra-cigarra, serpente-voadora, gafanhoto-cobra, cigarra-doida, cigarra-cobra,* and *jacaré-namboya* (Becker 1976; Buzzi 1994; Cascudo 1972; Lenko and Papavero 1996). Ihering (1963), however, says that the term *jaquiranabóia* is the original term. Et-

TABLE 1.—Gender-based differences of the diagnostic criteria used to describe the lantern-fly (*Fulgora laternaria*) (Hemiptera, Fulgoridae) during open-ended interviews performed with 86 residents of the village of Pedra Branca.

	Gender			
Diagnostic criteria	Male (n = 41)	Percentage	Female (n = 45)	Percentage
Morphological criteria				
Head's conspicuousness	7	8.1	10	11.6
Absence of eyes	7	8.1	8	9.3
Absence of mouth	2	2.3	0	0
Presence of sting	13	15.1	7	8.1
Presence of eye spots	2	2.3	1	1.1
Presence of wax	1	1.1	0	0
Biological criteria				
Reproduction	1	1.1	0	0
Habitat (Serra da Jibóia)	8	9.3	9	10.4
Feeding habit	1	1.1	3	3.4
Host tree	8	9.3	2	2.3
Change to another being	2	2.3	0	0
Noxious criteria				
It kills/dries trees	13	15.1	22	25.5
It kills/dries people	12	13.9	15	17.4
It causes blindness	0	0	1	1.1
It is venomous*	12	13.9	19	22.0

* This noxious characteristic includes others like 'angry', 'bad', 'dangerous', 'harmful', and 'fierce'.

ymologically, the word *jaquirana* comes from the Tupi-Guarani language: ***ñakyrã*** means cicada (Sampaio 1995). In the 1926 issue of *Revista do Museu Paulista* the term *jakiranaboia* appears. According to Cruz (1935), it is a corruption of *andira-nabóia,* which means a bat-like animal (*andirá*) with a snake body (*mboia*). Tastevin (1923) and Carrera (1991) corroborate the Tupi-Guarani origin for the word, which can be glossed as snake-like cicada (***yaki*** 'cicada', ***rana*** 'similar', ***mboya*** 'snake'). By using this folk name, indigenous peoples have recognized the resemblance between *Fulgora* species and cicadas. Both are jumping, free-feeding hemipterans. In folk biological classification systems, names that cross the boundaries of communities and extend to a larger region have gained great cultural significance (Berlin 1992).

In the nomenclature system of the Jibaro-Aguaruna Indians, the lantern-fly is known as ***manchi dapi*** (Guallart 1968). Among the Bororo Indians, the term ***aróe eporéu*** is the generic designation given to these insects; it means an insect similar in its external shape to a corpse wrapped up in mats (Albiseti and Venturelli 1962). The Xerente people call it ***anquecedarti,*** which means flying-snake (Posey 1986a). The Canela Indians who inhabit the south of Barra do Corda, Maranhão refer to it both as ***ka-no-iará*** and ***heganunui.*** Unfortunately, the etymology of these words has not been provided (Vanzolini 1956–58).

The Significance of the Insect's External Features for Naming and Folk Perception.—The abundance of terms currently used to designate the insects of the genus *Fulgora*

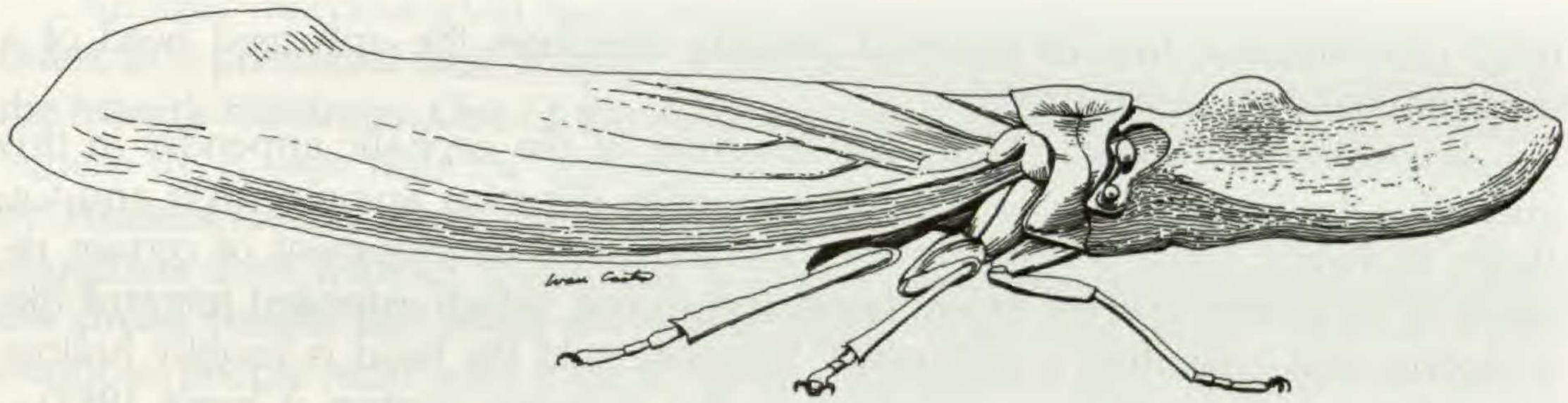

FIGURE 1.—Lateral view of *Fulgora* cf. *laternaria* L.; specimen is 50 mm long. (Drawing based on photograph of a specimen collected in the study area).

presumably results from their awesome appearance (Figure 1). When the informants talked about the insect, they mentioned the most prominent character—the head—whose shape reminded them that of a snake's or a cayman's head. A similarity to a chestnut was noted too, as can be seen in the following interviewees' assertions:

> The head is strange. It looks like a chestnut. (Mr. E., 62 years old)
>
> Its head looks like a cayman's head. (Mrs. E., 34 years old)
>
> The head is very ugly. It is like a snake. (Mrs. V., 58 years old)
>
> I am explaining that its head reminds [me] of an alligator's head. Have you ever seen it? It has a closed mouth and its head is spongy, very spongy, isn't it? It has nothing inside. And it is horrible. (Mrs. N., 38 years old)
>
> It looks like a moth, but its head is like a snake's. (Mr. P., 54 years old)

Much as people native to the region remark on the similarity of lantern-fly to snakes and crocodiles, scientifically-trained observers do, too. Gilmore (1986) comments on the insect's "swollen face, which is fantastically like a cayman's head, [and] even reproduces its protuberant eyes and sharpened teeth." Spix and Martius (1938) had already noticed this resemblance as they wrote the folk name *jacaré-mamboya,* the cayman-like snake. When Poulton (1932) described two specimens coming from the Brazilian Amazon, he reported that the entire visible surface of the insect in an attitude of rest (except the wings) reminded him of a cayman. As O'Brien and Wilson (1985) stated, members of *Fulgora* have a head that resembles a peanut (dorsal view) or the head of an alligator or cayman (lateral view). The scientific name given to *F. crocodilia* Brailovsky and Beutelspachen, 1978 from Mexico reveals the resemblance of this species to a cayman (Brailovsky and Beutelspachen 1978). A certain likeness with the head of snakes can be admitted, especially if the following features are taken into account: the lateral square maculae to the labial scales and pits of boids, and in some *Fulgora* species, a black spot between the false eye and nostril to the loreal fossa of arboreal pit vipers of the genus *Bothrops* (Hogue 1984). The insect has also been compared to a winged dragon (Cascudo 1972), and Hogue (1993) introduced the common name dragon-headed insect for *F. laternaria* based on the shape and mimetic pattern of the large

head protuberance that he believed actually simulates the upturned head of a medium-sized, arboreal lizard.

According to Fonseca (1926), the structure of the cephalic appendix in this and other fulgorid genera of the Fulgorini tribe (*Phrictus* Spinola, 1839 and *Cathedra* Kirkaldy, 1903) is owed to the "extraordinary development of certain regions of its surface (vertex, front, faces, and so on), which extended forward like a bladder and constitute a gibbosity." Someone said the head is usually hollow, but there is a sac which is connected to the digestive system (Grassé 1952)—presumably sap can be stored there for later digestion.[2] It is believed that the frontal region's protuberance, which in some fulgorids is extended like a voluminous process similar to those of membracids' thoracic structures (Grassé 1952), is a defense against natural enemies (birds, lizards, and small mammals). However, there are no reports that confirm the protective advantage of this formation (Hagmann 1928). Birds, for example fly-catchers, are predators of other fulgorids, as shown by the analysis of stomach contents and photographs.[3]

Two folk species of lantern-fly seems to inhabit the region of the Serra da Jibóia. According to a single interviewee who provided that information, the true species of *jequitiranabóia* possesses a round head, whereas the false one is slender (Mr. T., 34 years old). Actually, one might hypothesize the existence of more than one species of *Fulgora* living sympatrically in this area, since three other species are found within the state of Bahia: *F. lampetis* Burm., 1845, *F. graciliceps* Blanchard, 1849, and *F. lucifera* Germar, 1821 (O'Brien 1989). Thus, further ethnotaxonomic studies are urgently needed. Perhaps accurate recording of trees on which eggs are laid would help.[4]

The 'sting' that everybody fears is nothing but the piercing-sucking stylet located in the middle line of the body and folded between the legs (Santos 1987). It is only when the insect is going to suck the phloem from plants that this long 'murderer dart' (Cruz 1935) is extended. Dukinfield Jones, who has spent many years in Brazil, corroborated the statement about the native superstitions by noting the insect had a poisoned spine or point at the end of its head that is capable of flying at a man's chest and inflicting a wound (Poulton 1928).

When people talk about the head, they always refer to the 'sting' as well. They think it is the vehicle the insect uses to 'inject the mortal poison':

> It has a sting in its belly. If it strikes a tree it dries up. It can be a jackfruit tree [*Artocarpus integrifolia* L.], it can be a coconut tree [*Cocus nucifera* L.], whatever. Even if it strikes a person he/she will die. (Mr. M., 57 years old)
>
> Its sting is beneath [the body]. In the moment it is going to sit on a person, then it stretches the sting out. (Mr. L., 41 years old)
>
> It has a mischievous sting. When it drives the sting against the tree it kills the plant. (Mrs. S., 82 years old)
>
> It is said that the danger is when it is furious. When it flies it extends the little beak ('sting') forward. Wherever that beak touches . . . Cause it is venomous . . . It is not fierce when it is calm. (G., 22 years old)
>
> It doesn't have a mouth but a sting. (Mr. E., 80 years old)

Another morphological characteristic that was emphasized by the informants refers to a presumed lack of eyes. Of 86 interviewees, 15 have called attention to the insect's blindness. One of the main reasons for the widespread panic when a lantern-fly is seen near the community is this supposed blindness. As stressed by Fonseca (1926), when the insect "flies in the middle of the living beings it slaughters lives without distinction of class." The following testimony describes the dread people feel about its zigzag flight: "That tiranabóia is like this. For example, people must have a lot of defense because . . . If it comes flying, where it . . . Because it is blind. It strikes. The tree dies. If a person, it is also said that [if] it strikes, [he/she] dies" (Mrs. E., 52 years old). However, the apparent blindness of the lantern-fly has been questioned by one of the informants: "People say it is blind. But what! Once I killed one and I saw two eyes like those of a cicada" (Mr. E., 62 years old).

Besides the head, the wings deserve some attention because of the eye spots: "It has marks like these on the wing. It looks like two eyes that we see when it flies" (Mr. E., 62 years old). On another occasion, this same informant said: "I know it is beautiful when the insect is flying because there are two eyes beneath the wings." One female informant compared the eye spots with those markings on the peacock's feathers. The literature records that *Fulgora laternaria* resembles an owl butterfly (genus *Caligo,* the 'witch' in the local perception) because the hind wings, shorter and wider than the fore wings, present large marks that look like the owl's eyes (Ihering 1968; Penny and Arias 1982). Such eye spots would seem to serve a startle or warning function as well (O'Brien 1989). As Ross (1994) states, false eyes are much more frightening when revealed unexpectedly, causing hesitation or delay, in a nervous predator's decision to attack.

Interviewees stressed the presence of 'ash' released by the insect. Fulgorids are known by their wax secretion, whose white filaments solidify in contact with the air and take the aspect of a substance resembling flakes of asbestos (Ihering 1968). Some species (e.g., *Cerogenes auricoma* Burmeister, 1835) produce elaborate trailing plumes of white wax from the abdomen. *Fulgora laternaria* do not develop this trailing plume, but the thin, white, powdery wax is often so abundant that it covers part of the insect's body. This helps the insect to look like the lichens or scars on the bark (Carrera 1956). In fact, fulgorids' primary defense is their ability to be homochromous with the substrate on which they live (Robinson 1982). The white powder that covers its body has been regarded as a strong emetic. The simple inhalation of it was enough to provoke vomiting (Burmeister 1952). This secreted wax is considered highly aphrodisiac in Colombia (Anzola 2001).

How the Lantern-fly Was Categorized.—The way the villagers of Pedra Branca perceive the *jequitiranabóia*'s external morphology plays a preponderant role in their ethnoentomological classification system. The shape of the head, the presence of eye spots on the hind wings, the presence of a 'sting', the wax production, and the presumed absence of mouth and eyes are all salient features that contribute to the imaginary construction of an animal potentially deadly to men, animals, and plants. Depending on the way informants perceived the lantern-fly it could be assigned to five distinct ethnosemantic domains. About 47% of the 86 interviewees classified it as a snake, 10% of them regarded it as a moth, 8% classified

it as a cicada, 3% considered it as a beetle, and 1% thought about it as a grasshopper. This ethnocategorization appears in the local expression "It is a kind of." The other 32% of the respondents gave no information related to the insect's folk classification. Some examples of the informants' statements concerning the insect ethnotaxonomy are cited below:

> It is a beetle, but it has the shape of a snake. (E., 24 years old)
>
> It imitates a moth when its wings are folded. (Mr. A., 56 years old)
>
> It is a large insect resembling a moth. It has a caterpillar's face. (Mrs. M., 55 years old)
>
> A brave beetle. It is not a snake, but a beetle. (Mr. Q., 33 years old)
>
> It is a snake, isn't it? A winged-snake. (Mr. Z. P., 108 years old)
>
> It is a kind of grasshopper . . . (Mrs. L., 78 years old)
>
> People say it is a venomous snake and it is a kind of cicada. (Mr. D., 78 years old)

In Pedra Branca, the continual inclusion of *Fulgora laternaria* in the 'snake' domain and the strong aversion to it was observed through the projective tests. When a villager captured one specimen, he did not touch it and he was followed by a small group of curious people who wanted to see the weird creature more closely. On that occasion, they warned that a winged-snake should not be handled! One informant, who wondered about the presence of 'feet' (legs) as she was looking at a picture, questioned the insect's classification as a venomous snake: "Is this the winged-snake? Even on photograph I had no knowledge about it. A footed-winged snake? It resembles much more an insect, a thing. With leg and everything! Snake creeps" (Mrs. T., 68 years old).

As it was noted, 'snake' was the ethnosemantic domain used by the majority of the informants to classify the *jequitiranabóia.* Yet snake (the animal itself) can be also considered as a kind of insect, since the lexeme 'insect' includes other taxa beyond Insecta in the ethnobiological classification systems. For example, the Pankararé Indians from Brejo do Burgo village, northeastern Brazil, view snakes as 'insects' because they cause damage to people and domestic animals (Costa-Neto 1997). However, the boa (*Boa constrictor* L., 1768) is not considered an 'insect' because it is useful (they eat it as food). Costa-Neto (2000a) has explained the way human societies construct the ethnocategory 'insect' through the Entomoprojective Ambivalence Hypothesis: human beings tend to project attitudes and feelings of harmfulness, danger, irritability, repugnance, and disdain toward non-insect animals (e.g., toads, rats, scorpions, vultures, snakes, bats, lizards, earthworms, spiders, among others), by associating them with the culturally defined category 'insect'. The idea of ambivalence comes from sociology and relates to the attitudes that oscillate among diverse, and sometimes, antagonistic values. Projection results from the psychological processes by which a person attributes to another being the reasons for his/her own conflict and/or behavior. Accordingly, 'insects' can be seen as a representational category since they become metaphorical realizations of other beings or their qualities (Greene 1995). Nolan and Rob-

bins (2001) state that the organization of ethnozoological semantic domains ('mammal', 'snake', 'bird', 'fish', 'insect', etc.) is influenced both by the emotive meaning and the culturally constructed attitudes toward these domains. Indeed, the way people perceive, identify, categorize, and classify the natural world changes the way they think, act, and feel in relation to the animals.

As Posey (1986b) points out, folk biological classification systems do not always fit in classificatory schemes that biology artificially attempts to organize. Thus, cognitive categories cannot be considered as universal and must be inferred through a methodological approach that allows the researcher 'to discover' the conceptual paradigms instead of impose them on the society under study (Posey 1987). For example, in their folk entomological classification system the Kayapó Indians from the Brazilian State of Pará categorize animals with shells and no flesh as equivalent to insects (Posey 1983). To the Ndumba, an ethnic group that lives in the highlands of New Papua Guinea, *tovendi* is an ethnocategory that refers to all insects and arachnids (Hays 1983). In some contexts, however, *tovendi* can be assigned to inedible animals (e.g., some types of toads), while in other contexts it can mean any creature considered disgusting (e.g., snakes).

Considering Berlin's principles of categorization (Berlin 1992), the term 'insect' and its similar (emic) equivalents usually represent the level of classification associated with a life-form category. This level of ethnobiological classification is, according to Berlin, the broadest classification of organisms in groups that are apparently easily recognized on the basis of innumerable morphologic characters. Studies of Brazilian ethnoentomology have shown, however, that in folk zoological classification systems the life-form 'insect' is identified and described based not only on morphologic and biological characters, but especially on the psychoemotional criteria, which are very important when someone is naming the organisms. In other words, folk taxonomies are based not only on the knowledge of biological characteristics (cognitive dimension), but also on feelings (affective dimension), beliefs (ideological dimension), and behaviors (ethological dimension).

Traditional Knowledge Concerning the Lantern-fly's Ecological Aspects.—Informants' folk entomological knowledge based on habitat has revealed that *Fulgora laternaria* lives on the trunk of a tree species that appears to be more common in the Serra da Jibóia than in the other hills. According to two key informants, the *jequitiranabóia* "stays on the *pau-paraíba*" (*Simarouba* sp., Simaroubaceae). As one of them has said, "[One] can go anytime and find it. Sometimes, two or three are on the same wood" (Mr. E., 62 years old). The other has added: "Now, through the bushes, there is a wood that is said it is where it stays more. It is on that *pau-paraíba* (. . .). Who knows, sees and says: 'That is the *jitiranabóia* over there'" (Mr. Q., 64 years old). Eight other informants have confirmed the association between the insect and this tree. Because the insect is always seen on the trunk of this tree, people generally associate its emergence with spontaneous generation; that is, they think the insect is born naturally from the wood: "It comes from the *pau-paraíba*" (Mr. Q., 64 years old).

At the end of the nineteenth century along the Bahian south coast, lantern-fly was already known as *bicho do pau paralıy'ba* because it frequented this tree

(Branner 1885). Bondar (1931) stressed that *F. laternaria* lives on *Simaba versicolor* St. Hilaire in Bahia State. Lantern-flies and several other species of Fulgoridae were observed and collected on trunks of *Simarouba amara* Aublet in Santarém, Pará, and in the region of Marmoré River, in Bolivia (Poulton 1932).

The preference for a given tree species has been proved by Johnson and Foster (in Hogue et al. 1989). In a study carried out in a period of five years at Santa Rosa National Park in Costa Rica these authors observed that 98 of 100 adult *F. laternaria* were seen on trunks of *Hymenaea* sp. (Fabaceae). This preference has a scientific explanation. Fulgoromorpha are generally closely associated with their host-plants that give them food, shelter, and protection against predators (Penny and Arias 1982). Different plants are known hosts to different species of *Fulgora*. It has been proposed that these plants serve as hosts to *Fulgora* spp. because they either produce and concentrate resins, oils, or bitter substances in their sap, possibly generating allelopathic chemicals: Simaroubaceae—*Simarouba amara* Aublet, *Simaba versicolor* St. Hilaire; Fabaceae—*Hymenaea oblongifolia* Lee and Langenheim, *H. coubaril* L., *Myroxylon balsamum* (L.) Harms; Rutaceae—*Zanthoxylum* sp.; Lecythidaceae—*Lecythis* sp.; Vochysiaceae—*Vochysia tucanorum* Martius; Bignoniaceae—*Jacaranda acutifolia* Humboldt and Bonpland; Apocynaceae—*Aspidosperma tambopatense* Gentry; Euphorbiaceae—*Hura crepitans* L.; Myrtaceae—*Eugenia oerstedeana* Berg., *Eucalyptus* sp. (Cruz 1935; Hogue 1984; Johnson and Foster 1986; Lenko and Papavero 1996; Poulton 1932).

Informants have also mentioned that the *jequitiranabóia* stays fixed to the tree when it dies: "In the place it sits, it stays. There it fixes the sting and does not get out. Then, it dies in that place" (Mrs. L., 66 years old). Another said: "The ancient ones told that the insect had a manner of sitting on green wood. It sat for a long time. Then, it weakened and died" (Mr. M., 68 years old). This fixation to the tree trunk due to its death has been reported also by Francisco Peres de Lima, in 1938 (Lenko and Papavero 1996).

Another fulgoroid species was collected on trunks of *Simarouba* sp. while we looked for *Fulgora* specimens at the upper slopes of the Serra da Jibóia. In those occasions, a key informant considered the insects as the lantern-fly's 'daughters'. (These are currently under taxonomic analysis.) Hogue (1984) recorded the presence of over 20 specimens of *Lystra lanata* (L., 1758) as he was examining *Simarouba amara* in the vicinity of Iquitos, Peru.

Informants also told us about the insect's origin. Individuals from older generations believe that the *jequitiranabóia* has come from the *sertão* (Brazilian arid midland): "There wasn't that kind of snake here. We only knew it through stories. Because they [people] say it is from the arid midland" (Mrs. E, 52 years old). According to another informant, the lantern-fly has come in the Serra da Jibóia because "it accompanied the herds of cattle that came from the *sertão,* from distant places" (Mrs. M., 62 years old). A third informant has stated that this insect has come from the South (of Bahia State?). The notion that this fulgorid comes from this arid environment was once used by the lexicographer Cândido de Figueiredo in his incongruous entry: "Venomous butterfly from the *sertão*" (Santos 1987).

Traditional and Scientific Knowledge of Jequitiranabóia*'s Feeding Habits.*—Villagers of Pedra Branca referred to the insect's feeding habits: "It feeds on the humidity of

the wood'' (Mr. E., 88 years old) because it ''sucks from the plant'' (Mrs. M., 30 years old). This ''humidity'' to which the informant referred can be interpreted as the sap, since fulgorids feed exclusively on trees and woody shrubs. They introduce their mouth apparatus ('sting' or 'beak') through the plant's bark and feed on phloem by turgor pressure (O'Brien and Wilson 1985). Apparently, the informants did not recognize the host tree (*pau-paraíba*) as being the source of food for *Fulgora laternaria*. Johnson and Foster (1986) reported that the phloem of *Simarouba amara* lies just below the smooth, thin outer bark. These authors stressed that this species possesses a phagostimulant on its trunk called simarolide, which is a quassinoid that probably is responsible for the insect's great attraction to this tree.

When hemipterans feed on phloem with an imbalance (for insects) of amino acids, they are able to obtain the food they need through symbiotic associations with microorganisms that live inside specialized cells known as mycetocytes (Chapman 1994). All Fulgoromorpha appear to have more than one type of mycetocyte microorganism and, in Fulgoridae, both yeasts and bacteria are present. Some species have as many as six different symbionts.

The Terrible Effects of its Sting.—The alleged 'deadly attack' on plants and human beings was the most cited and the best known of the *jequitiranabóia*'s behaviors. Since the insect is often perceived and categorized as a snake, people analogically confer on it the same fear they feel for the ophidians. Thus, the following testimonies were recorded:

> I have heard people talking about the *jitiranabóia*. That it is too venomous. I have heard my mother saying that the plant died whenever it was sat on. And there wasn't that snake here. (E., 24 years old)

> People fear it because it stings. It is like a snake. The poison that a snake carries it carries too. (Mrs. M., 55 years old)

> It is a dangerous snake. If it strikes a person it kills her. If it stings even wood the plant dies. (Mrs. E., 82 years old)

Although many informants mentioned the danger posed by the *jequitiranabóia*, there were individuals who questioned the risks attributed to having any dealings with it: ''I don't know. If it was like that many [trees] have already died in the forest'' (Mrs. G., 41 years old); ''People say it is venomous, but F. (19 years old) took a look at the dictionary and found it is not'' (Mrs. E., 52 years old). Carrera (1991) points out that the damages caused to the plants by its sting are insignificant and never result in death. Furthermore, these insects are too scarce to be harmful to trees (Ross 1994). Some fulgoroids, however, produce honeydew. This is a sweet, watery excrement that serves as the substrate for the growth of sooty mold. This blackens the leaf, decreases photosynthesis activity, decreases vigor, and often causes disfigurement of the host (Kessing and Mau 2001). Planthoppers also damage plants by ovipositing in plant tissues and by feeding in the phloem, sometimes spreading a variety of plant pathogens. At least three species of the Fulgoromorpha family Cixiidae are suspected vectors of the lethal yellowing of Canary Island date palms in Texas (Meyerdirk and Hart 1982). Considering our

informants' testimonies, many of which have stated that trees passed away due to the injuries brought about by the lantern-fly, it could be deduced that this insect probably bears some kind of deleterious virus or bacteria. Maybe one can make a case for carrying out a phytosanitary investigation on those trees struck 'dead' by it.

On the other hand, Janzen has seen *Fulgora* ovipositing and feeding for years on the same trees in Costa Rica, students at La Selva in Costa Rica can point out trees that have had *Fulgora* on them for several years, and that is true also in Belize in Rio Bravo Conservation Area.[5]

When asked about the occurrence of possible cases of injury and/or death caused by the 'attack' of a *jequitiranabóia* to any member from the village of Pedra Branca, or elsewhere, the informants replied that no real incident has ever been registered. Even so, the belief persists:

> It is spoken that if someone is stung he will die. But nobody ever saw anyone die. (Mrs. E., 34 years old)

> Here, when a tree dies, then they say soon: "That tree over there has died because the *jitirana* has rested on." But people have not died here. (Mrs. V., 58 years old)

> I've never heard [about any case of death], but we feel as soon as we see some trees in the forest, all dried up, with wrinkled leaves, and completely lifeless without any reason. It's just been caused by the insect itself. (Mrs. P., 80+ years old)

In the mid-nineteenth century, the lantern-fly was thought to kill animals and trees. Branner (1885) recorded that along the Amazon, when a monkey suddenly came tumbling down dead from the forest canopy without any apparent cause, it was said that he had been struck by the fatal *jequitiranabóia.* Branner cited a Spanish-American newspaper published two years before, which reported that this insect was said to be destroying the cattle of Brazil in the grazing country of the southern provinces. The idea that *Fulgora* is very poisonous is so deep-rooted in common attitudes that even an entomologist from the Rio de Janeiro National Museum blamed contact with the animal when he felt bad (Lenko and Papavero 1996). Stories of dramatic and tragic encounters abound in the literature. Bates, an eminent British entomologist who collected insects for eleven years along the Amazon River in the nineteenth century, was once told that one of these 'dangerous' creatures suddenly emerged from the forest and attacked and killed eight of a nine-member boat crew (Bates 1943).

Apparently, the evil attributed to the insect is not a simple belief at all. According to Hagmann (1928), *Fulgora laternaria* may sting when carelessly handled. And incidental circumstances may render it toxic, as when it feeds on sandbox tree (*Hura crepitans* L., Euphorbiaceae) or other plants that produce toxic or noxious allelopathic compounds. Then, it extracts those chemicals and makes itself a bearer of fatal toxins (Orico 1975). It is known that certain insects sequester toxic secondary plant compounds and store them in their bodies, and in this way gain protection from predators and pathogens (Engel 2002). Fortunately, no case of

death resulting from the attack of a *jequitiranabóia* has been found in the scientific literature.

If the insect is inoffensive, then what is the basis for such a terrifying tradition? Surely, the physical resemblance with ophidians is a reasonable explanation. But the origin for this fear may be also found in indigenous myths and legends. However, little if any information concerning its presence in native mythology is available. In an Amazonian legend about the Matintaperera, the lantern-fly is used as an instrument of torture (Lenko and Papavero 1996). Because of its anomalous morphology medicine men of many Amazonian tribes regard the insect as magically powerful and carry it (dead) in their amulet bags around their neck (O'Brien and Wilson 1985).

Some indigenous groups seem to consider the insects (or at least some of them) to be the tangible manifestation of ominous principles; these principles sometimes are attributable to the activity of some malevolent medicine men (Cesard et al. in press). To the Pälawan people, aggressive and poisonous animals such as ***älupjan*** (centipede), ***bäncanawa*** (scorpion), ***kätimamang kätimamang*** (bird-spider), and ***säli*** (snake) are said to be owned by malevolent non-human agents such as Länggam to whom they are totally obedient and friendly (Novelino 2002). The Munducuru Indians regard lice as the true materialization of the willingness of some animals to cause illnesses. The Yora/Yaminahua Indians of the Peruvian Amazon attribute a great number of illnesses to the malevolent spirits of noxious invertebrates such as wasps, which are blamed for gastrointestinal conditions, and a caustic millipede known as ***xaco***, which is associated with respiratory conditions. These Indians also blame urinary tract infections on termite spirits: "If one urinated on a termite mound, the termite would take vengeance and cause painful urination" (Shepard 1999). In fact, the belief in vengeful spirits of stinging insects is part of the Amerindian societies' folklore, which associates wasps and bees with a variety of mythical forces (Shepard 1999).

Different reasons for the consistent human aversion towards insects and other invertebrates, especially among many Westerners, have been proposed in the scientific literature (e.g., Kellert 1993). One suggests that people have an innate fear of potentially dangerous insects, which was generalized to include other animals. Another explanation is the association of invertebrates with illnesses and human habitation. A third is suggested by the notion of human alienation to creatures so different and distinct from our own species. To Laurent (1995), the general shape, the morpho-ethological aspects, and the negative sensations people attribute to the animals (e.g., disgust, revulsion) are reasons that explain man's aversion to the invertebrates, particularly to the insects. In general, more positive attitudes towards invertebrates can be found when these animals possess aesthetic, utilitarian, ecological or recreational values (Kellert 1993). In contrast, East Asian peoples have a more balanced perspective regarding insects, where most of them are considered to be aesthetically pleasing, good to eat, interesting pets, subjects of sport, enjoyable to listen to and useful in medicine (Pemberton 1999). Although a genetically inherited process cannot be ruled out, there are a number of theories which allude to cultural and social transmission of some common animal fears (Davey 1994; Matchett and Davey 1991).

Due to the socially constructed behaviors toward the *jequitiranabóia,* people of

Pedra Branca regard it as an organism that must be exterminated or dreaded whenever it is found. Such an affective representation, which occurs in the brain's limbic and neocortical organs (Soulé 1997), is done through images, stereotypes, and interpersonal myths. Since individuals are acting for 'rational' reasons (although scientifically incongruous), it can be said that the set of knowledge (= corpus) about the lantern-fly may be characterized as a kind of cognition that Anderson (1996) calls "hot cognition." According to him, the "hotter" the cognition of a given object is the better individuals will tend to think, know, speak, and act upon it. It is precisely because the lantern-fly represents a "potential danger" to human beings that it deserves some attention. That is why people generally know something about it, even though they have never seen the insect either *in situ* or *in vivo*. As Anderson (1996) emphasizes, emotional factors drive cognition.

Traditional Knowledge of the Lantern-fly's Reproduction.—With regard to the traditional knowledge related to the lantern-fly's reproductive behavior, we have just recorded information on the moulting process of the juveniles into adults. A key informant mentioned: "The daughters are black. Then, they transformed into large [insects] and change the color. Now, it changes its shape while it is growing. It is this same kind" (Mr. E., 62 years old). Another said: "The wood raises a beetle that originates it" (Mr. E., 88 years old). Although these informants know something about the metamorphosis process involving these insects, the 'daughters' actually were the adults of another fulgoroid species. At first sight we might think that such a classificatory relationship between two different species is a perceptive anomaly, but this parent-offspring relationship is based on a belief about ontogeny or origin which indicates a close similarity between them (Ellen 1985).

It is known that hemipterans develop through paurometaboly, which means their metamorphosis is gradual and inconspicuous (Kessing and Mau 2001). Apparently, Hagmann (1928) was the first scientist who described the nymph of *Fulgora laternaria*. He referred to it as a larva, very weird due to the shape of its long, cylindrical head (Figure 2). It resembles the adult in the possession of the inflated head structure but is wingless and much smaller.

There is little scientific knowledge about the *jequitiranabóia*'s reproduction and life history. Fonseca (1926) stated that "both sexes show the same color, design, and size, so that unless by the genitalia characters no superficial difference exists." The female has a reduced ovipositor, externally smaller that the male external genitalia (O'Brien and Wilson 1985). Literature records data concerning mating and oviposition, which occur on the host plants. Eggs are laid in masses on the surface of bark and glued together with a collateral fluid and covered with wax secreted from the abdomen (O'Brien and Wilson 1985). According to R. W. Hingston (in Hogue 1993:240), this structure is similar to a mantid egg case.

Local impressions of its transformation into another animal have been also recorded: "People say it turns into a *cobra-de-cipó* [maybe *Philodryas* sp., Colubridae]" (Mr. C., 32 years old). But this was a misconception, since the *jequitiranabóia* has been mistaken for the praying mantis (Mantodea). In the local classification system, mantids and phasmids are thought to arise from the branches and twigs of verbena (*Lantana camara* L., Verbenaceae) and change into snakes.

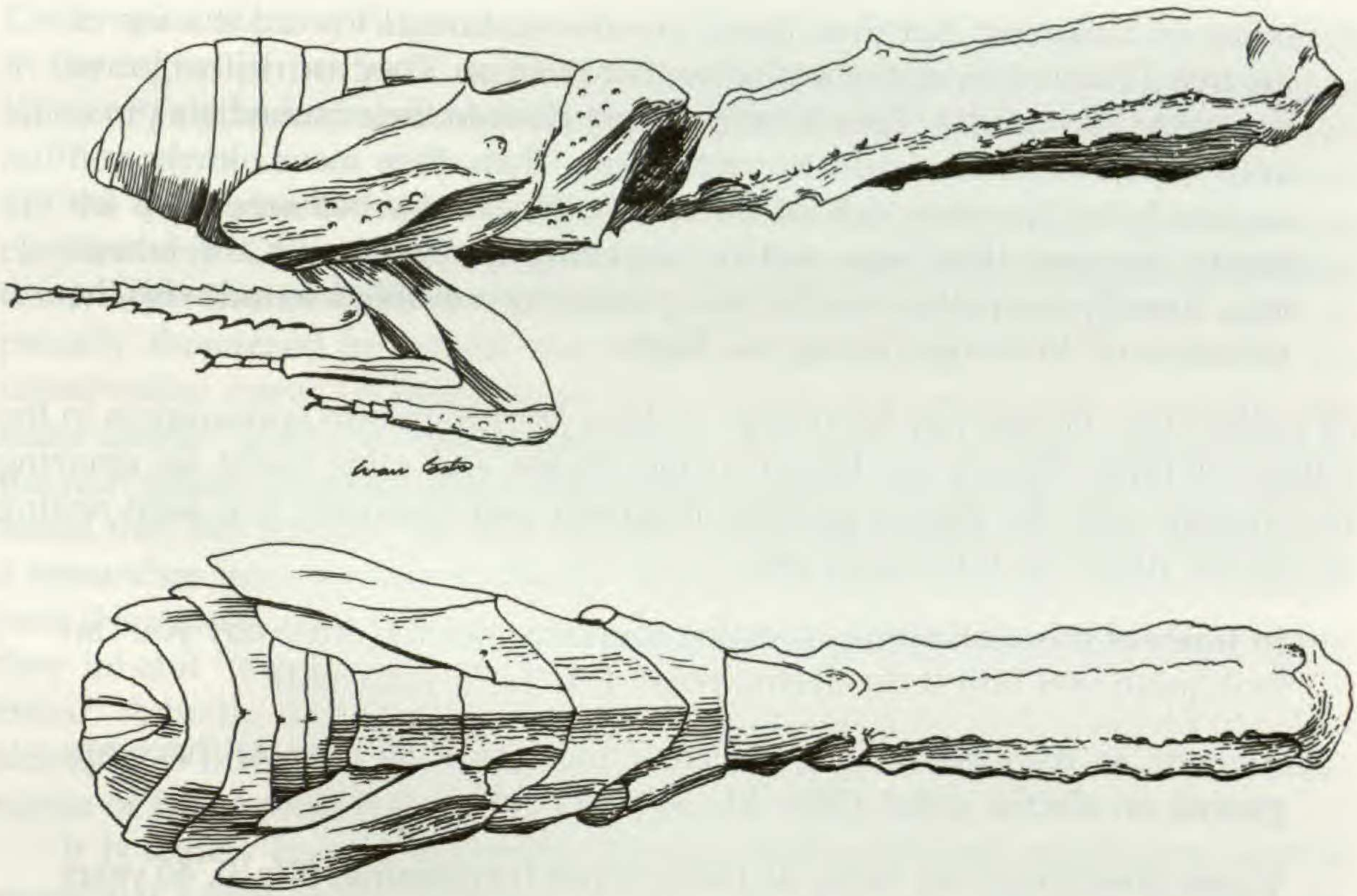

FIGURE 2.—Lateral and top views of the nymph of *Fulgora laternaria* L.; specimen is 68 mm long. (Redrawn from Hagmann 1928).

Other Behavioral Patterns.—Lantern-flies can drum their heads against the trunk of a tree if molested.[6] The informants have not commented on such behavior. The phenomenon of bioluminescence, which was first recorded by Nehemiah Grew in late 1681 and corroborated by Maria S. Merian's book *Metamorphosis Insectorom Surinamensium* published in 1705 (Ross 1994), was not mentioned by them, either. It is interesting to note that Grew erroneously attributed light produced by beetles of the genus *Pyrophorus* to *Fulgora.* Many discussions have followed since then. Ridout has studied that aspect with fast frozen specimens, and could not get a response using the chemical components of all known biological luminescence systems.[7] However, a luminescence in *Fulgora* may be observed and it is owed to the occasional, and generally deadly, appearance of pathogenic bacteria that develop on the abdomen and into the anterior intestinal caecum that is accommodated in the cephalic prolongation (Grassé 1952; Ihering 1968). The Amazonian peasants still believe that *F. laternaria* produces a type of prolonged sound in the evening similar to the whistle of a train. However, it is the cicada *Quesada gigas* Olivier, 1790 that produces this stridulation (Lenko and Papavero 1996).

When persistently and sufficiently molested, *Fulgora* species may emit a volatile, fetid defensive chemical released as a "skunk-like spray" (Janzen and Hogue 1983). However, no glands specifically for the production of noxious odors seem to exist in the insect's body. Hogue (1984) suggests that such volatiles could reside in the body's covering of wax. Additional information on its behavior is found in Fonseca (1926), who writes:

> They stay motionless, phlegmatic, for hours in one spot, by placing them-

selves in a manner that their heads are always turned toward the top of the tree. I have never seen them at another position. They are neither brave nor noisy like cicadas. They let anyone get close to their immediate proximity and extend the hand to catch them. Then, they move slowly and cautiously to the other side of the trunk. When very bothered they leisurely rise over their legs, and by impelling the body with the former legs, they fly to another nearby tree, producing a muffled sound with the vibration of the wings during the flight.

Of Lantern-flies, Storms, and Electricity.—Fulgora laternaria's rare appearances in the village of Pedra Branca are linked to the storms and rains (what an amazing relationship with the Roman goddess Fulgora!), and invariably it is seen resting on electric poles. As informants say:

> In times of thunderstorms, of strong thunders, [in] the other day you can look [and] you find it on electric poles. (Mr. J., 78 years old)
>
> As soon as the electric light has come more than 50 [insects] have appeared on electric poles. (Mrs. M., 36 years old)
>
> It gets down from the 'Serra da Jibóia' when it is raining. (Mr. F., 40 years old)
>
> As soon as the light has come, people [the parents] didn't allow anybody to get out. They said: 'The snake is crazy! The snake is crazy!' (Mr. V., 36 years old)

The insects of the family Fulgoridae are luciphilous;[8] artificial light spots often attract them (Poulton 1932). Fonseca (1926) has noted that "sometimes these insects look for light, at night, landing on electric poles or entering through the windows wherever there is some clarity." After the introduction of electric energy in the village of Pedra Branca, people came into more regular contact with invertebrates. Dozens of different insects (e.g., moths, beetles, katydids) and their natural enemies, attracted by luminosity inside the houses, came in. In fact, the establishment of electricity caused great cultural changes. An informant mentioned that electricity was the reason they felt apprehensive about the insects. The electric poles were placed along the village's main street, so most of the trees that bordered it have been cut down in order to avoid harboring during the day the insects that were attracted to the lights at night.

Of the *jequitiranabóia*'s nocturnal activity, one key informant has said it 'walks' only at night (Mr. E., 62 years old). Hogue (1984) says that specimens of *Fulgora laternaria* typically rest during the day on the trunks of trees. They position themselves vertically with their anterior protuberance uppermost and elevated at an angle away from the substratum. As Johnson and Foster (1986) pointed out, the vertical position may be a conservative characteristic of the family Fulgoridae. Hogue (1984) sees in this posture a mimetic correspondence similar to that assumed by certain arboreal Iguanidae lizards. According to him, these insectivorous lizards probably are the lantern-fly's closest predators; thus, the insect tries to resemble them.

Conservation Status of Fulgora *spp.*—Considering the actual environmental situation in the region of the Serra da Jibóia, it could be thought that the local subpopulation of *Fulgora laternaria* might be particularly at risk of extinction. The two main anthropogenic causes of forest fragmentation and associated loss of entomofauna are the expansion of cattle-raising and the extraction of wood, which still occurs clandestinely. Conspicuous species, due to their associated ecological specializations, often live in closed or sedentary populations that are considered to be especially threatened by habitat fragmentation (van Hook 1997). Considering the conservation status of Brazilian primary forests, it is reasonable to expect that some species of *Fulgora* may be present in some red list of threatened animals in the near future. In Venezuela, *F. laternaria* is already listed as one.[9] In 1932, Poulton noted that this species was rarer than it was 20 years before. Gabriel Mejdalani,[10] a researcher from the Rio de Janeiro National Museum and specialist in leafhoppers (Hemiptera, Cicadellidae), believes that lantern-flies may be vulnerable since they inhabit "the interior of primary forests on the thickest trunks of the oldest trees." Actually, they are relatively rare because they exist in low population densities. To O'Brien, the conservation of *Fulgora* spp. is conditioned by the maintenance of forest preserves.[11]

It is widely known that public support for conservation continues to rest on emotional rather than intellectual motives, and has been garnered primarily by cute and cuddly vertebrates (van Hook 1997). As van Hook points out, humans most readily learn about, care about, and make sacrifices for animals that are visible, familiar, aesthetically appealing, and that demonstrate positive benefits to mankind. Innate fear of insects may also create obstacles to their conservation, especially when species are inconspicuous, unattractive, and economically unimportant (Kellert 1993). Thus, as a main contribution of the present research for the conservation of *F. laternaria* and their kin, we would suggest an environmental education program especially built on emotive basis in order to change, or at least diminish, people's feelings of fear and aversion towards fulgorids. It is hoped that the data now available will be incorporated into a curriculum by those researchers interested in biology conservation and ethnobiology as well.

CONCLUSION

The set of knowledge, beliefs, feelings, and behaviors that individuals from the village of Pedra Branca possess related to *Fulgora laternaria* shows that it has some cultural importance. Although people fear it, they think about it and put it in their oral literature. In general, local knowledge of its ethnotaxonomy, ecology, feeding habits, and behavior is in agreement with the scientific entomological knowledge. According to the ethnotaxonomic classification system, more than one species of *Fulgora* may live sympatrically in the area of the Serra da Jibóia. A further systematic taxonomic survey would clarify this point.

The way local people behave toward the *jequitiranabóia* results from their perceptions of and feelings about it. Because *F. laternaria* is categorized into different ethnosemantic domains, especially 'snake', the entomoprojective ambivalence hypothesis is reinforced. Although it is perceived as deadly poisonous, no actual

case of injury or death has been recorded. Even so, the culturally constructed attitudes toward it make people kill it whenever they find one.

The subpopulation of *Fulgora laternaria* living in the area of the Serra da Jibóia might be at risk of extinction due to anthropogenic factors. Local people should be involved if we are to achieve an efficient strategy for the conservation of *Fulgora* and other species. Thus, folk entomological knowledge would not only assist researchers in their understanding on the ecological role played by insects, but also would help them to comprehend native cultures (Blake and Wagner 1987). Additionally, decision-makers would be able to apply proper conservation programs and management practices only if they recognized that the cultural perspective is to be taken into account in every debate focused on biological conservation policy (Costa-Neto 2000b).

NOTES

[1] Its taxonomic identification deserves more attention, since other three species inhabit the Atlantic rain forest in Bahia State.

[2] Dr. Lois O'Brien, Florida A & M University, Tallahassee, personal communication, 2001.

[3] Dr. Lois O'Brien, personal communication, 2001.

[4] Dr. Lois O'Brien, personal communication, 2001.

[5] Dr. Lois O'Brien, personal communication, 2001.

[6] *Fulgomorpha* Lists on the Web [on-line: http://flow.snv.jussieu.fr/introduction/fulgores_en.html] (verified December 17, 2002)

[7] Dr. Lois O'Brien, personal communication, 2001.

[8] Entomologists' most common way of collecting Fulgoridae is by hanging a night light or an ultraviolet light in front of a white sheet hung on a line between trees. Lois O'Brien, personal communication, 2002.

[9] Fundación Polar, Caracas [on-line: http://www.fpolar.org.ve/librorojo/insectos.htm] (verified January 13, 2003)

[10] Dr. Gabriel Mejdalani, Departamento de Entomologia, Museu Nacional, Rio de Janeiro, letter dated July 5, 2001.

[11] Dr. Lois O'Brien, personal communication, 2001.

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